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ABSTRACT

Focusing on printing and publishing occupations, this document is one in a series of forty-one reprints from the Occupational Outlook Handbook providing current information and employment projections for individual occupations and industries through 1985. The specific occupations covered in this document include newspaper reporters, photographers, photographic laboratory occupations, technical writers, and various occupations in the printing and publishing industry (compositors, lithographers, photoengravers, electrotypers, stereotypers, printing press operators and assistants, bookbinders, and bindery workers). The following information is presented for each occupation or occupational area: a code number referenced to the Dictionary of Occupational Titles; a description of the nature of the work; places of employment; training, other qualifications, and advancement; employment outlook; earnings and working conditions; and sources of additional information. In addition to the forty-one reprints covering individual occupations or occupational areas (CE 017 757-797), a companion document (CE 017 756) presents employment projections for the total labor market and discusses the relationship between job prospects and education. (BM)

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ED158108

CE

Printing and Publishing Occupations

Reprinted from the
Occupational Outlook Handbook,
1978-79 Edition.
U.S. Department of Labor
Bureau of Labor Statistics
1978

Bulletin 1955-3

Containing the midpoints of the legs of right triangle *RST*, whe
pt. (−5, 5), *S* is pt. (1, 1), and *T* is pt. (3, 4).

Containing the longer diagonal of a quadrilateral whose verti
pts. (2, 2), (−2, −2), (1, −1), and (6, 4).

Show that the equations $y - 1 = \frac{3}{4}(x + 3)$ and $y - 4 = \frac{3}{4}(x$
are equivalent.

An equation of the line containing pts. (−2, 3) and (4, −1) c
written in the form $y - 3 = -\frac{1}{2}(x + 2)$, or in the
$y + 1 = -\frac{1}{2}(x - 4)$, depending upon which point you take
(x_1, y_1). Show that the two equations are equivale

Show that the equations are equivalent.

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1) \qquad y - y_2 = \frac{y_1 - y_2}{x_1 - x_2}(x - x_2)$$

State the equation of a line through pt. (p, q) and parallel to
containing pts. (a, b) and (c, d). $(p \neq c)$

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CE 017 758

NEWSPAPER REPORTERS

(D.O.T. 132.268)

Nature of the Work

Newspaper reporters gather information on current events and use it to write stories for publication in daily or weekly newspapers. In covering events, they may interview people, review public records, attend news events, and do research. As a rule, reporters take notes or use tape recorders while collecting facts, and write their stories upon return to the office. Sometimes, to meet deadlines, they telephone their information or stories to rewriters who write or transcribe the stories for them.

Large dailies frequently assign some reporters to "beats," such as police stations or the courts, to gather news originating in these places. General assignment reporters handle various types of local news, such as a story about a lost child or an obituary of a community leader. Specialized reporters with a background in a particular subject interpret and analyze the news in fields such as medicine, politics, science, education, business, labor, and religion.

Reporters on small newspapers may cover not only all aspects of local news, but also may take photographs, write headlines, lay out pages, and write editorials. On some small weeklies, they also may solicit advertisements, sell subscriptions, and perform general office work.

Places of Employment

More than 40,000 persons worked as newspaper reporters in 1976. The majority of reporters work for urban daily newspapers; others work for suburban, community, or small town weekly papers and press services.

Reporters work in cities and towns of all sizes. Of the 1,762 daily and 7,579 weekly newspapers, the great majority are in medium-sized towns. However, most reporters work in cities, since big city dailies employ many reporters, whereas a small town paper generally employs only a few.

Training, Other Qualifications, and Advancement

Most newspapers consider only applicants who have a college education. Graduate work is increasingly important. Many editors prefer graduates who have a degree in journalism, which usually includes training in the liberal arts along with professional journalism training. Some editors consider a liberal arts degree sufficient. Others prefer applicants who have a liberal arts bachelor's degree and a master's degree in journalism. High school courses that are useful include English, journalism, social science, and typing.

Bachelor's degree programs in journalism are available in almost 250 colleges. About three-fourths of the courses in a typical undergraduate journalism curriculum are in liberal arts. Journalism courses include reporting, copyreading, editing, feature writing, history of journalism, law, and the relation of the press to society.

More than 500 junior colleges offer journalism programs. Twelve to fifteen hours of credit earned is transferable to most 4-year college programs in journalism. A few junior colleges also offer programs especially designed to prepare the student directly for employment as a general assignment reporter on a weekly or small daily newspaper. The Armed Forces also provide some training in journalism.

Reporters gathering news information.

A master's degree in journalism was offered by more than 90 schools in 1976; about 20 schools offered the Ph. D. degree. Some graduate programs are intended primarily as preparation for news careers, while others concentrate on preparing journalism teachers, researchers and theorists, and advertising and public relations workers.

Persons who wish to prepare for newspaper work through a liberal arts curriculum should take English courses that include writing, as well as subjects such as sociology, political science, economics, history, psychology, computer science, and speech. Ability to read and speak a foreign language is desirable. Those who look forward to becoming reporters in a specialized field such as science should concentrate on course work in their subject matter areas. Skill in typing is essential because reporters type their own news stories. On small papers, knowledge of news photography also is valuable.

The Newspaper Fund and individual newspapers offer summer internships that provide college students with an opportunity to practice the rudiments of reporting or editing. In addition, more than 2,700 journalism scholarships, fellowships, and assistantships were awarded to college journalism students by universities, newspapers, and professional organizations in 1976.

News reporting involves a great deal of responsibility, since what a reporter writes frequently influences the opinion of the reading public. Reporters should be dedicated to serving the public's need for accurate and impartial news. Although reporters work as part of a team, they have an opportunity for self-expression. Important personal characteristics include a "nose for news," curiosity, persistence, initiative, resourcefulness, an accurate memory, and the physical stamina necessary for an active and often fast-paced life.

Some who compete for full-time reporter jobs find it is helpful to have had experience as a newspaper "stringer"—a part-time reporter who covers the news in a particular area of the community and is paid on the basis of the stories printed. High school and college newspapers, and church or community newsletters, also provide writing and editing experience that may be helpful in getting a job.

Most beginners start on weekly or on small daily newspapers as general assignment reporters or copy editors. A few outstanding journalism graduates are hired by large city papers, but this is the exception rather than the rule. Large dailies generally require several years of reporting experience, which usually is acquired on smaller newspapers.

Beginning reporters are assigned duties such as reporting on civic and club meetings, summarizing speeches, writing obituaries, interviewing important visitors to the community, and covering police court proceedings. As they gain experience, they may report more important events, cover an assigned "beat," or specialize in a particular field.

Newspaper reporters may advance to reporting for larger papers or press services. Some experienced reporters become columnists, correspondents, editorial writers, editors, or top executives; these positions represent the top of the field and competition for them is keen. Other reporters transfer to related fields such as public relations, writing for magazines, or preparing copy for radio and television news programs.

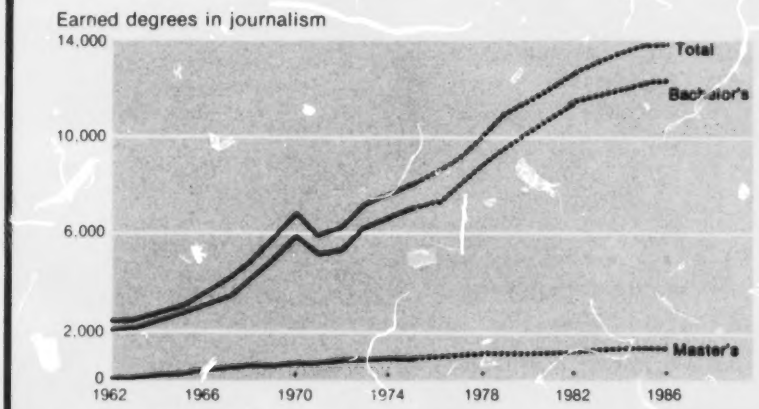
Employment Outlook

Competition for newspaper reporting jobs is expected to continue through the mid 1980's. If enrollments continue at record levels as they have in the past few years, record numbers of journalism graduates will be looking for jobs. However, employment in the communications field is not expected to expand sufficiently to absorb all those seeking jobs, and a sizable number of journalism graduates will have to launch careers in other fields.

Newspaper reporters in particular face heightened job competition. Although the communications field is expected to expand through the mid-1980's, newspapers are not expected to share fully in this growth. As a result, employment of reporters will increase more slowly than the average for all occupations. Most job openings will arise from the need to replace reporters who are promoted to editorial or administrative positions, transfer to other fields of work, retire, or leave the profession for other reasons.

Bright, energetic persons with exceptional writing ability will have the best opportunities for beginning jobs as newspaper reporters. Talented writers who are able to handle news about highly specialized scientific or

Rapid increase in the number of journalism graduates will produce intense competition for communications jobs



Source: National Center for Education Statistics

technical subjects will also be at an advantage in the competitive job market.

Weekly or daily newspapers located in small towns and suburban areas are expected to continue to offer most of the opportunities for beginners entering newspaper reporting. Openings arise on these papers as reporters gain experience and move up to other editorial positions or transfer to reporting jobs on larger newspapers or to other types of work. Beginning reporters able to help with photography and other specialized aspects of newspaper work and who are acquainted with the community are likely to be given preference in employment on small papers.

Most big city dailies require experience and do not ordinarily hire new graduates. Sometimes, however, new graduates find newsroom jobs on major metropolitan dailies because of outstanding credentials in an area for which a particular paper has a pressing need. Occasionally, the experience and contacts gained through an internship program lead to a reporting job directly after graduation.

In addition to newspaper reporting, college graduates who have majored in journalism have the background for jobs in related fields such as advertising, public relations, trade and technical publishing, radio and television, and law. Because continued high enrollment is foreseen in journalism education programs, opportunities to teach journalism are expected to be good. College teaching jobs currently require professional experience and at least a master's degree.

Earnings and Working Conditions

Reporters working for daily newspapers having contracts negotiated by The Newspaper Guild had average starting salaries of $10,600 in late 1976. In general, earnings of newspaper reporters in 1976 were above average earnings received by nonsupervisory workers in private industry, except farming.

Minimum salaries of reporters having 4 or 5 years of experience who worked for daily newspapers with Guild contracts averaged $16,700 in 1976. The minimums ranged from $9,960, paid by the smallest dailies, to more than $26,000 paid by the largest. Many reporters, however, were paid salaries higher than these minimums. Reporters working for national wire services received annual salaries of at least $19,000.

Most newspaper reporters generally work a 5-day, 35- or 40-hour week. Reporters working for morning papers usually start work in the late afternoon and finish at about midnight. Most reporters also receive benefits such as paid vacations, group insurance, and pension plans.

Sources of Additional Information

Information about opportunities for reporters with daily newspapers is available from:

American Newspaper Publishers Association Foundation, P.O. Box 17407, Dulles International Airport, Washington, D.C. 20041.

For information on opportunities in the newspaper field and starting salaries of journalism graduates, as well as a list of journalism scholarships, fellowships, assistantships, and loans available at colleges and universities, write to:

The Newspaper Fund, Inc., Box 300, Princeton, N.J. 08540.

Information on union wage rates is available from:

The Newspaper Guild, Research and Information Department, 1125 15th St. NW., Washington, D.C. 20005.

For general information about careers in journalism contact:

American Council on Education for Journalism, School of Journalism, University of Missouri, Columbia, Mo. 65201.

Association For Education in Journalism, 102 Reavis Hall, Northern Illinois University, Dekalb, Ill. 60115.

The Society of Professional Journalists, Sigma Delta Chi, 35 East Wacker Dr., Chicago, Ill. 60601.

Information on opportunities for women in newspaper reporting and other communications fields is available from:

Women In Communications, Inc., P.O. Box 9561, Austin, Tex. 78766.

Names and locations of daily newspapers and a list of schools and departments of journalism are published in the *Editor and Publisher International Year Book*, available in most public libraries and large newspaper offices.

PHOTOGRAPHERS

(D.O.T. 143.062, .282, and .382)

Nature of the Work

Photographers use their cameras and film to portray people, places, and events much as a writer uses words. Those who are skillful can capture the personality of individuals or the mood of scenes which they photograph. Some photographers specialize in scientific, medical, or engineering photography, and their pictures enable thousands of persons to see a world normally hidden from view.

Although their subject matter varies widely, all photographers use the same basic equipment. The most important piece, of course, is the camera, and most photographers own several. Unlike snapshot cameras, which have a lens permanently attached to the camera body, professional cameras are constructed to use a variety of lenses designed for close-up, medium-range, or distance photography.

Besides cameras and lenses, photographers use a variety of film and colored filters to obtain the desired effect under different lighting conditions. When taking pictures indoors or after dark, they use electronic flash units, floodlights, reflectors, and other special lighting equipment.

Some photographers develop and print their own photographs in the darkroom and may enlarge or otherwise alter the basic image. Many photographers send their work to photographic laboratories for processing.

Because the procedures involved in still photography are quite different from those in motion picture photography, many photographers specialize in one or the other. However, there is a growing demand for

Commercial photographers must be imaginative and original.

photographers who have training in both areas.

In addition to knowing how to use their equipment and materials, photographers must be capable of composing the subjects of their photographs and recognizing a potentially good photograph.

Many photographers specialize in a particular type of photography, such as portrait, commercial, or industrial work. Portrait photographers take pictures of individuals or groups of persons and often work in their own studios. For special events, such as weddings or christenings, however, they take photographs in churches and homes. Portrait photographers in small studios frequently do all the operations, including scheduling appointments and setting up and adjusting equipment before taking the pictures, as well as developing and retouching negatives, developing proofs, and mounting and framing pictures. They also may be the ones to collect payments and keep records, and therefore must be good business persons.

Commercial photographers photograph a wide range of subjects including livestock, manufactured articles, buildings, and large groups of people. They frequently do photography for catalogs. Those in advertising take pictures to promote such items as clothing, furniture, automobiles, and food, and may specialize in one such area. Advertising photographers must know how to use many different photographic techniques.

The work of industrial photographers is used in company publications to report to stockholders or to advertise company products or services. Industrial photographers also photograph groups of people for employee news magazines or may take motion pictures of workers operating equipment and machinery for management's use in analyzing production or work methods. They may also use special photographic techniques as research tools. For example, medical researchers often use ultraviolet and infrared photography, fluorescence, and X-rays to obtain information not visible under normal conditions. Time lapse photography (where time is stretched or condensed), photomicrography (where the subject of the photography may be magnified 50 or 70 times or more), and photogrammetry (surveying an area using aerial photography) are other special techniques.

Other photographic specialties include photojournalism, or press photography, which combines a "nose for news" with photographic ability; and educational photography (preparing slides, filmstrips, and movies for use in the classroom).

Places of Employment

About 85,000 photographers were employed in 1976. The greatest proportion worked in commercial studios; many others worked for newspapers and magazines. Government agencies, photographic equipment suppliers and dealers, and industrial firms also employed large numbers of photographers. In addition, some photographers taught in colleges and universities, or made films. Still others worked freelance, taking pictures to sell to advertisers, magazines, and other customers. About one-third of all photographers were self-employed.

Jobs for photographers are found in all parts of the country—both small towns and large cities—but are concentrated in the more populated areas.

Training, Other Qualifications, and Advancement

Photographic training is available in colleges, universities, junior colleges, and art schools. Over 75 colleges and universities offer 4-year curriculums leading to a bachelor's degree in photography. Some colleges and universities grant master's degrees in specialized areas, such as photojournalism. In addition, some colleges have 2-year curriculums leading to a certificate or an associate degree in photography. A formal education in photography gives a solid fundamental background in a variety of equipment, processes, and techniques. Art schools offer useful training in design and composition, but not the technical training needed for professional photographic work. (See the statement on commercial artists elsewhere in the *Handbook*.) The Armed Forces also train many young people in photographic skills.

Although a high school education is desirable, the photography profession has no set entry requirements with regard to formal education or training. However, the training a prospective photographer has determines the type of work for which he or she qualifies.

People may prepare for work as photographers in a commercial studio through 2 or 3 years of on-the-job training as a photographer's assistant. Trainees generally start in the darkroom where they learn to mix chemicals, develop film, and do photoprinting and enlarging. Later they may set up lights and cameras or help an experienced photographer take pictures.

Amateur experience is helpful in getting an entry job with a commercial studio, but post-high school education and training usually are needed for industrial or scientific photography. Here success in photography depends on being more than just a competent photographer, and adequate career preparation requires some knowledge of the field in which the photography is used. For example, work in scientific, medical, and engineering research, such as photographing microscopic organisms, requires a background in the particular science or engineering

specialty as well as skill in photography.

Photographers must have good eyesight and color vision, artistic ability, and manual dexterity. They also should be patient and accurate and enjoy working with detail. Some knowledge of mathematics, physics, and chemistry is helpful for understanding the use of various lenses, films, light sources, and development processes.

Some photographic specialties require additional qualities. Commercial or freelance photographers must be imaginative and original in their thinking. Those who specialize in photographing news stories must be able to recognize a potentially good photograph and act quickly, for otherwise an opportunity to capture an important event on film may be lost. Photographers who specialize in portrait photography need the ability to help people relax in front of the camera.

Newly hired photographers are given relatively routine assignments that do not require split-second camera adjustments or decisions on what subject matter to photograph. News photographers, for example, may be assigned to cover civic meetings or photograph snow storms. After gaining experience they advance to more demanding assignments, and some may move to staff positions on national news magazines. Photographers with exceptional ability may gain national recognition for their work and exhibit their photographs in art and photographic galleries, or publish them in books. A few industrial or scientific photographers may be promoted to supervisory positions. Magazine and news photographers may eventually become heads of graphic arts departments or photography editors.

Employment Outlook

Employment of photographers is expected to grow more slowly than the average for all occupations through the mid-1980's. In addition to openings resulting from growth, others will occur each year as workers die, retire, or transfer to other occupations.

Growth of employment in business and industry is occurring as greater importance is placed upon visual aids for use in meetings, stockholders' reports, sales campaigns, and public relations work. Video and motion picture photography are becoming increasingly important in industry. Photography also is becoming an increasingly important part of law enforcement work, as well as scientific and medical research, where opportunities are expected to be good for those possessing a highly specialized background.

The employment of portrait and commerical photographers is expected to grow slowly, and competition for jobs as portrait and commercial photographers and photographers' assistants is expected to be keen. These fields are relatively crowded since photographers can go into business for themselves with a modest financial investment, or work part time while holding another job. The increased use of self-processing cameras in commercial photography also has contributed to the crowding in this field, since little photographic training is required for such work.

Earnings and Working Conditions

Beginning photographers who worked for newspapers that have contracts with The Newspaper Guild had weekly earnings between $128 and $432 in 1976, with the majority earning between $175 and $225. Newspaper photographers with some experience (usually 4 or 5 years) averaged about $320 a week in 1976. Almost all experienced newspaper photographers earned over $225; the top salary was nearly $505 a week.

Photographers in the Federal Government earned an average of $14,900 a year in 1976. Depending on their level of experience, newly hired photographers in the Federal Government earned from $8,320 to $11, 520 a year. Most experienced photographers earned between $11,520 and about $18,460 a year.

Experienced photographers generally earn salaries that are above the average for nonsupervisory workers in private industry, except farming. Although self-employed and freelance photographers often earn more than salaried workers, their earnings are affected greatly by general business conditons and the type and size of their community and clientele.

Photographers who have salaried jobs usually work a 5-day, 35-40 hour week and receive benefits such as paid holidays, vacations, and sick leave. Those in business for themselves usually work longer hours. Freelance, press, and commercial photographers travel frequently and may have to work in uncomfortable surroundings. Sometimes the work can be dangerous, especially for news photographers assigned to cover stories on natural disasters or military conflicts.

Sources of Additional Information

Career information on photography is available from:

Photographic Art & Science Foundation, 111 Stratford Rd., Des Plaines, Ill. 60016.

Professional Photographers of America, Inc. 1090 Executive Way, Des Plaines, Ill. 60018.

PHOTOGRAPHIC LABORATORY OCCUPATIONS

(D.O.T. 970.281, 976.381, .687 through .887)

Nature of the Work

Amateur snapshots, home movies, professional portraits, and photographs to illustrate publications require the skills of thousands of photographic laboratory employees. These workers develop film, make prints and slides, and perform related tasks, such as enlarging and retouching photographs. (This chapter does not discuss employees of laboratories who specialize in processing professional motion picture film.)

All-round darkroom technicians (D.O.T. 976.381) can perform all tasks necessary to develop and print film. They know how to develop film manually, as well as how to operate

and maintain any automatic equipment used in processing film. The technician varies the developing process according to the type of film—black-and-white negative, color negative, or color positive. For example, a developing process for black-and-white negative film covers five steps: developer, stop bath, fixing bath, washing, and drying. The first three steps use chemical solutions and are performed in darkness. In a hand operation, the technician first immerses unwound film in the developer, a solution that brings out the image on exposed film. When the film has remained in the developer for a specified period, the technician transfers it to a stop bath to prevent overdevelopment. Next, the film is placed in a fixing bath that makes it insensitive to light to prevent further exposure. Finally, the technician washes the film with water to remove the fixing solution and places the film in a drying cabinet. Although hand operations are performed in some small photographic studios, in many photographic labs technicians regulate machines that automatically perform the steps described above.

Processes for developing color films are more complex than those used for black-and-white. Thus, some labs employ *color technicians* (D.O.T. 976.381)—highly skilled workers who specialize in processing color film.

Some high schools and trade schools offer photography courses that include training in film processing.

The darkroom technician makes a photograph by transferring the image from a negative to photographic paper. Printing frequently is performed on a projection printer, which consists of a fixture for holding negatives and photographic paper, an electric lamp, and a magnifying lens. The technician places the negative between the lamp and lens, and the paper below the lens. When the technician turns on the lamp, light passes through the negative and lens and records a magnified image of the negative on the paper. During printing, the technician may vary the contrast of the image or remove unwanted background by using paper patterns to shade part of the photographic paper from the projected image. After removing the exposed photographic paper from the printer, the technician develops it in much the same way as the negative. If the customer desires, the technician mounts the finished print in a frame or on a paper or cardboard back.

In addition to working in the laboratory, darkroom technicians may set up lights and cameras or otherwise assist experienced photographers. Many technicians, particularly those who work in portrait studios and aspire to become professional photographers, divide their time between taking and processing pictures. In some labs, helpers assist technicians. They also may be assisted by workers who specialize in a particular activity, such as *developers* (D.O.T. 976.381), *printers* (D.O.T. 976.381), and *retouchers* (D.O.T. 970.281).

In most large photo labs where the film-developing processes are largely automated, darkroom technicians supervise semiskilled workers who do specialized assignments requiring only a limited knowledge of developing and printing. Included are *film numberers* (D.O.T. 976.887), who sort film according to the type of processing needed and number each roll for identification; *film strippers* (D.O.T. .976.884), who unwind rolls of film and place them in developing machines; *printer operators* (D.O.T. 976.782), who operate machines that expose rolls of photographic paper to negatives; *print developers, machine* (D.O.T. 976.885), who operate machines that develop these rolls of exposed photographic paper; *chemical mixers* (D.O.T. 976.884), who measure and combine the various chemicals that make up developing solutions; *slide mounters* (D.O.T. 976.885), who operate machines that cut, insert, and seal slides in cardboard or plastic mounts; and *photocheckers and assemblers* (D.O.T. 976.687), who inspect the finished slides and prints and package them for customers.

Places of Employment

In 1976, about 35,000 persons worked in photo lab occupations.

Most semiskilled workers are employed by large photofinishing labs that specialize in processing film for amateur photographers. A large proportion of darkroom technicians work in photo labs operated by portrait and commercial studios and by manufacturers, newspaper and magazine publishers, advertising agencies, and other organizations. Darkroom technicians also work in commercial labs that specialize in processing the work of professional photographers.

Photo lab workers are situated in all parts of the country, but employment is concentrated in the more populous areas such as New York, Los Angeles, Chicago, and other large cities.

Training, Other Qualifications, and Advancement

Most darkroom technicians learn their skills through informal on-the-job training. Beginners start as helpers and gradually learn to develop and print film by assisting experienced technicians. It generally takes about 3 years to become a fully qualified darkroom technician. Some helpers become specialists in a particular activity, such as printing or developing. Generally, the training time required in order to become a specialist is less than is needed to become an all-round darkroom technician.

When hiring darkroom technician helpers, employers prefer applicants who are high school graduates. Courses in chemistry and mathematics are helpful to people interested in

this trade. Some high schools and trade schools offer courses in photography that include training in film processing. The Armed Forces also offer training for darkroom technicians. Experience gained through processing film as a hobby is helpful.

Two-year curricula leading to an associate degree in photographic technology are offered by a few colleges. Completion of college level courses in this field is helpful to people who are interested in supervisory and managerial jobs in photo labs.

Many darkroom technicians eventually become professional photographers. (See statement on photographers elsewhere in the *Handbook*.) Others advance to supervisory positions in laboratories.

Training for workers in semiskilled photolab occupations ranges from a few weeks to several months of on-the-job training. For example, film numberers and slide mounters usually can learn their jobs in a few weeks, but printer operators and chemical mixers may need several months or longer. For many semiskilled jobs, manual dexterity, good vision including normal color perception, and good hand-eye coordination are important qualifications.

Employment Outlook

Employment in photo lab occupations is expected to increase faster than the average for all occupations through the mid-1980's. In addition to jobs from employment growth, many openings will result from the need to replace experienced workers who retire, die, or transfer to other occupations.

The need for semiskilled workers is tied closely to the growth of amateur photography. Film purchases by amateur photographers are expected to increase as a result of rising population and personal income. Improvements in still and movie cameras that make them easier to load and operate also should contribute to an increase in the use of film. However, due to the growing popularity of self-processing instant cameras and the increased use of mechanized film-processing equipment in photo labs, employment will not grow as fast as the amount of film used.

The need for all-round darkroom technicians is expected to increase as a result of the growing demand for photography in business and government. A major factor contributing to this demand will be the increasing variety of printed matter that is illustrated with photographs. The growing use of photography in research and development activities also will contribute to the demand for darkroom technicians.

Earnings and Working Conditions

Earnings of photo lab workers vary greatly and depend on factors such as skill level, experience, and geographic location. Inexperienced photo lab workers generally earned between $2.40 and $3.50 an hour in 1976, according to the limited information available. Workers in semiskilled occupations earned from $2.40 to $5 an hour. Among these workers, printer operators and chemical mixers generally had the highest earnings. In general, darkroom technicians and those in supervisory positions earned more than the semiskilled specialized workers. Most of the experienced darkroom technicians earned between $4.50 and $7.50 an hour in 1976.

The majority of photo lab employees work a 40-hour week and get premium pay for overtime. In labs that specialize in processing film for amateur photographers, employees may work a considerable amount of overtime during the summer and for several weeks after Christmas. Many labs employ temporary workers during these seasonal peaks.

Photo lab jobs are not physically strenuous, but in many of the semiskilled occupations the work is repetitious and the pace is rapid. Some workers (for example, printer operators and photocheckers and assemblers) are subject to eye fatigue. Photofinishing labs are generally clean, well-lighted, and air-conditioned.

Sources of Additional Information

For information about employment opportunities in photographic laboratories and schools that offer degrees in photographic technology, write to:

Photo Marketing Association, 603 Lansing Ave., Jackson, Mich. 49202.

Professional Photographers of America, Inc., 1090 Executive Way, Des Plaines, Ill. 60018.

Photographic Art and Science Foundation, 111 Stratford Rd., Des Plaines, Ill. 60016.

TECHNICAL WRITERS

(D.O.T. 139.2.018)

Nature of the Work

Technical writers put scientific and technical information into language that can readily be understood by people who need to use it. They research, write, and edit technical materials and also may produce publications or audiovisual materials. To ensure that their work is accurate, technical writers must be expert in the subject area in which they are writing—laser beams or pharmacology, for example. At the same time, their writing must be clear and easy to follow. Command of the language and versatility of style are tools of the trade that enable technical writers to convey information in a way that is helpful to people who use it—scientists, technicians, executives, sales representatives, and the general public.

Some organizations use job titles other than "technical writer." Depending on the particular employer, people in technical writing jobs may be called publications engineers, communications specialists, industrial writers, medical writers, communicators, or instructional materials developers.

Technical writers set out either to instruct or inform, and in many instances they do both. They prepare manuals, catalogs, parts lists, and instructional materials needed by the sales representatives who sell machinery or scientific equipment and by the technicians who install, maintain, and service it. Instructional aids must be prepared to assist the people who operate complex equipment—for example, the technicians who monitor sophisticated diagnostic

equipment in a hospital's coronary care unit. Writing manuals and training aids for military weapons and equipment is a highly specialized field of technical writing. Sometimes technical writers are asked to write scripts for training films, or to prepare instructional materials for self-teaching cassettes, filmstrips, or kits.

Many technical writers prepare reports on the results of research projects. By communicating research developments to other scientists, engineers, and technicians, these reports speed scientific and technical progress and help prevent duplication of effort. Reports also play an important part within a company; hundreds of progress reports may be sent from one department to another within the course of a year. Detailed reports also must be prepared for regulatory agencies and for agencies that fund research and development projects. Some reports—environmental impact statements, for example—require such a detailed treatment of technical subjects that they usually are prepared by scientists with the assistance of technical writers. Annual reports to stockholders sometimes are an additional responsibility.

Proposal preparation is another important duty of technical writers. Proposals are requests for the money or facilities to conduct a project, develop a prototype of a new product, or do research. When a proposal is being prepared, scientists and engineers provide the technical materials, management provides the budget, and a team of technical writers usually shapes the final proposal.

Manuals, reports, and proposals make up the bulk of technical writing today; however, the work may take other forms. Technical writers may write specifications; prepare speeches and news releases; edit and write technical books; prepare articles for popular magazines; develop advertising copy, promotional brochures, and text for exhibits and displays; and handle technical documentation.

When they begin a writing assignment, technical writers usually start by learning as much as they can about the subject. They study reports, sometimes blueprints; read technical journals; consult with engineers, scientists, and technicians who have worked on the project; or examine the equipment. After they have assembled as much information as appropriate, given the time they have and the purpose of the document, they draw up an outline. Then they prepare a rough draft, which may undergo several revisions before being accepted in final form. Technical writers usually arrange for the preparation of tables, charts, illustrations, and other artwork that accompanies a finished document and may work directly with technical illustrators, drafters, or photographers.

Places of Employment

An estimated 22,000 technical writers and editors were employed in 1976. Many work for large firms in the electronics, aviation, aerospace, ordnance, chemical, pharmaceutical, and computer manufacturing industries. Firms in the energy, communications, and computer software fields also employ many technical writers.

Research laboratories employ significant numbers of technical writers. Some laboratories are affiliated with manufacturing companies to concentrate on developing products or improving the manufacturing process. Other research laboratories—including those connected with universities, government agencies, or private foundations—engage in both basic and applied research.

The Federal Government employs technical writers and editors in areas as diverse as the physical sciences, weapons development, agriculture, health, and space exploration. Three out of four technical writers and editors in the Federal Government work for the Department of Defense. Other agencies that employ technical writers include the Departments of Interior; Agriculture; Health, Education,and Welfare; and the National Aeronautics and Space Administration.

Many people in this occupation work directly for publishing houses. They hold writing and editing jobs with business and trade publications; professional journals in engineering, medicine, physics, chemistry, and other sciences; and publishers of scientific and technical literature.

The rapidly growing information industry provides a new area of employment for technical writers. Commercial firms that provide their clients with access to a computerized data base employ technical information specialists to collect, process, and manage a vast amount of information. Technical writers are particularly well suited for such jobs because of their combination of technical and communications skills. Such jobs also are available at the technical information centers run by major industrial firms and research laboratories.

Established technical writers may work on a free-lance basis or open their own agencies or consulting firms.

Technical writers are employed all over the country but the largest concentrations are in the Northeast, Texas, and California.

Training, Other Qualifications, and Advancement

There are no rigid requirements for entry into the field. As a result, people having a variety of backgrounds find jobs as technical writers. Employers seek people whose educational background or work experience indicates that they are familiar with a technical subject and can write about it effectively. Knowledge of graphics and other aspects of publication production may be helpful in getting a job. An understanding of current trends in communication technology is an asset, and familiarity with computer operations and terminology is increasingly important.

A college degree is helpful, and many employers insist on it. Hiring criteria vary, however. Many employers prefer candidates with a degree in science or engineering plus a minor in English, journalism, or technical communications. Other employers emphasize writing ability and, in turn, look for candidates whose degrees are in journalism or the liberal arts. Depending on their line of business, these employers almost always require course work or practical experience in a specific

subject as well—computer science or biochemistry, for example.

Besides having writing skills and scientific or technical expertise, technical writers should be intellectually curious and able to think logically. They must be very accurate in their work and must be able to deal precisely with a mass of detailed material. Because they often work as part of a team, they should be able to work with others; this requires tact and a cooperative attitude. Technical writers sometimes work alone for long periods with little or no supervision, so they must also be disciplined about work habits and schedules.

Most technical writers do not enter the occupation directly from college. The majority work initially in other jobs, usually as technicians, scientists, or engineers. Some begin as research assistants, editorial assistants, or trainees in a company's technical information or advertising department. In time, these people may assume writing duties and develop technical communication skills. When a flair for writing becomes evident, they may seek a technical writing position in the same company or find a writing job elsewhere.

While many employers consider only seasoned, experienced writers in filling vacancies, not all do. Some firms hire college graduates for writer trainee positions. People with solid backgrounds in science or engineering are at an advantage in competing for such jobs. Those with bachelor's or master's degrees in technical writing are often preferred over candidates who have little or no writing background. However, a degree in almost any field may be acceptable, providing the candidate has the necessary technical and communications skills. Beginners can develop experience and demonstrate their ability through writing material for local weekly newspapers and by publishing articles in student journals. A portfolio of writing samples is helpful when applying for a job.

The majority of technical writers have work experience as technicians, scientists, or engineers.

In 1976, 10 colleges and universities offered programs leading to a bachelor's degree in technical writing, and 4 schools had associate degree programs. Graduate programs leading to a master's degree in technical writing were offered at six schools, one of which also offered a Ph. D. These programs have various names, including science or medical writing, science information, technical journalism, and technical communication.

Most undergraduate programs in technical writing are interdisciplinary. While such programs may be based in the communications, journalism, or language and literature department, they generally are given in close cooperation with the mathematics, engineering, and science departments. At most schools, about 30 percent of the student's course work is in communications. Typical courses include communication theory, writing and editing, layout and design, and graphics. From 25 to 40 percent of the courses are in science or technology. The remainder of the program may be in the social sciences and humanities, or may be devoted entirely to electives. Students usually are advised to take courses in related fields such as computer science and statistics. At many schools, internships in industry or government give students in the technical writing program an opportunity for first-hand job experience.

Graduate programs in technical writing emphasize the field of communications. Many graduate students in technical writing already have a bachelor's degree in science, engineering, or technology. Others come from liberal arts backgrounds. A typical graduate program includes courses in the theory of communication, writing and editing, technology assessment, and management.

Although only a few schools offer degrees in technical writing or technical illustrating, hundreds of colleges and universities offer one or more courses in these fields. Students with such diverse majors as agriculture, chemistry, engineering, and business administration can elect courses in advanced composition, copy editing, typography, technical advertising, industrial communications, and proposal writing, for example. Many engineering schools offer English courses to sharpen writing skills, and several have developed extensive course offerings in technical writing. Several schools of journalism offer courses in medical journalism.

Numerous special institutes, seminars, and workshops are available to bring technical writers up to date. Some take the form of intensive 1- or 2-week summer seminars sponsored by colleges and universities. Others are workshops run by technical communication consultants or by organizations that specialize in employee training and development.

Beginners often assist experienced technical writers by doing library research and preparing drafts of reports. Experienced writers in companies with large technical writing staffs may move to the job of technical editor or shift to an administrative position in the publications or technical information departments. The top job is that of publications manager, who normally supervises all of the people directly involved in producing the company's technical documents. The manager supervises not only the technical writers and editors, but also the staff responsible for illustrations, photography, reproduction, and distribution.

After gaining experience and contacts, some technical writers freelance or form their own firms. Some consulting firms handle industrial publicity and technical advertising for corporate clients. Other technical communications firms do the actual writing and production of the catalogs, manuals, and brochures that may be needed for the promotion of a new product, for example. Successful technical writers are frequently in demand to conduct writing seminars in industry and government, and

some teach at colleges and universities in addition to their regular jobs.

It also is possible to advance by becoming a specialist in a particular scientific or technical subject. These writers sometimes prepare syndicated newspaper columns or articles for popular magazines.

Employment Outlook

Employment of technical writers is expected to increase about as fast as the average for all occupations through the mid-1980's. In addition to openings due to growth, opportunities will result from the need to replace those who die, retire, or transfer to other occupations. Employment opportunities will be best for experienced technical writers and for beginners who have both writing ability and a scientific or technical background. People who cannot demonstrate both a technical background and communications skills may face stiff competition for beginning jobs.

Demand for technical writers is expected to increase because of the continuing expansion of scientific and technical information and the need to communicate research results to the scientific community as effectively as possible. Also contributing to the demand for technical writers is the growing need to put scientific and technical information into language that corporate managers, sales representatives, and service technicians can understand. With the increasing sophistication and complexity of industrial and scientific equipment, more and more users will depend on the technical writer's ability to prepare explanations and instructions in precise but simple terms.

Government expenditures for research and development (R&D) will continue to have a significant effect on job opportunities for technical writers. Their employment, like that of scientists and engineers, is linked to spending levels for basic research and for product development in such important areas as defense, space exploration, energy, pollution control, medicine, and communications technology. Through the mid-1980's, R&D expenditures are expected to increase, but growth will be slower than it was during the peak period of the 1960's.

Relatively few job openings are expected in the Federal Government. The number of technical writers and editors employed by Federal agencies has declined since the late 1960's, and most vacancies will occur as Federal employees retire or transfer to other jobs.

Earnings and Working Conditions

Salaries depend not only on the amount and kind of education a technical writer has, but also on experience and the ability to produce. The type, size, and location of the employer also are important. Earnings generally are higher on the East Coast and in California than in other parts of the country. Free-lancing can be an important source of additional income, but freelance earnings vary greatly because they depend on the writer's ability and reputation.

Starting salaries for college graduates began at about $10,000 in 1976, although graduates with degrees in engineering, science, or technical communications generally began at $12,000 or more. Experienced technical writers averaged around $19,500 a year in 1976, while those in supervisory positions earned $25,000 or more. There were substantial regional variations, however.

In the Federal Government in 1977, beginning technical writers with a bachelor's degree and about five science courses were paid $9,303 a year; those with a bachelor's degree and 1 year's specialized experience could start at $11,523 a year. The average salary for technical writers in Federal agencies was $19,901.

Technical writers, in and out of government, may work under considerable pressure, frequently working overtime to meet publication deadlines. Their working environment generally is clean and well-lighted.

Sources of Additional Information

For information about careers in technical writing and the names of colleges and universities that offer programs in technical communication, contact:

Society for Technical Communication, Inc., Suite 421, 1010 Vermont Ave. NW., Washington D.C. 20005.

For information about careers and workshops in the field of health communication, contact:

American Medical Writers Association, Suite 290, 5272 River Rd., Bethesda, Md. 20016.

OCCUPATIONS IN THE PRINTING AND PUBLISHING INDUSTRY

Printing is both an art and one of our chief means of communication. In 1976, the printing and publishing industry employed almost 1.1 million workers. Government agencies and private firms that do their own printing, such as banks and insurance companies, also employed thousands of printing workers.

Nature and Location of the Industry

Included in the industry are the printing and publishing of newspapers, magazines, books, and advertising matter; the production of business forms, greeting cards, and gift wrappings; commercial or job printing; bookbinding; and typesetting, photoengraving, platemaking, and other printing services, primarily for printing establishments.

In 1976, the largest division in terms of employment was newspaper printing and publishing, with over 380,000 employees. Most daily and many weekly newspapers throughout the Nation do their own printing. Although some major newspapers have more than 2,000 employees, many have fewer than 20.

Commercial printing shops, the second largest division of the industry, employed about 349,000 workers. These shops produce a variety of materials, including advertising matter, business cards, calendars, catalogs, labels, maps, and pamphlets. They also print limited-run newspapers, books, and magazines. Many commercial shops have several hundred workers, but employment is concentrated in smaller shops.

Printing jobs are found throughout the country. Almost every town has at least one printing shop, frequently, a small newspaper plant that also may do other printing. However, about one-half of the Nation's printing employees are in five States—New York, Illinois, California, Pennsylvania, and Ohio. Within these States, most printing activities are in or near manufacturing, commercial, or financial areas such as New York, Chicago, Los Angeles, San Francisco-Oakland, Philadelphia and Cincinnati. Other leading centers of printing are Boston, Detroit, Minneapolis-St. Paul, Washington, D.C., St. Louis, and Dayton. Employment in book and magazine printing is highly concentrated in these areas. A much larger proportion of newspaper employment, however, is found outside these centers because of the great number of small local newspapers.

Printing Methods

Printing is a means of transferring ink impressions of words and pictures to paper, metal, or other materials. A plate of metal, rubber, or plastic is prepared so that part of it can be covered with ink. The ink is then transferred to a sheet of paper or other material that is pressed against the plate.

In letterpress printing, the letters and images are raised from the rest of the printing plate. Printing is achieved by covering the printing surface with ink and pressing it directly against paper, thus transferring the image onto the paper. In gravure printing, the image is etched into the surface of a cylinder. The whole surface is covered with ink and then wiped off; ink is left only in the sunken or etched areas. When paper is pressed against the surface, the ink is lifted out and appears on the paper. In lithography (offset printing), the printing plate surface is smooth, with both image and nonimage areas on the same level. Lithography is based on the principle that grease and water do not mix. The plate's image areas are coated with a substance to make the greasy printing ink stick to the plate and then moistened with water so that only the image areas take up the ink. The inked image is transferred from the plate to a rubber blanket and then to the paper.

Screen printing is a method in which inks or other materials such as paint and varnish are forced through a stencil mounted on a finely woven screen. The shape of the stencil openings determines the design to be printed. This process may be applied to a variety of surfaces such as paper, glass, metal, plastic, and textiles.

The printing and publishing industry employed almost 1.1 million workers in 1976.

Printing Occupations

Production of printed materials requires workers in a wide variety of occupations. Printing craft workers represent a large segment of these employees. They usually specialize in one area of printing operations: Type composition, photography, platemaking, presswork, or binding. Their training generally is confined to only one of the basic printing methods—letterpress, lithography, or gravure. Some of the principal printing crafts are briefly described below. Detailed information on these crafts is presented in the section on printing occupations elsewhere in the *Handbook*.

The printing process begins in a composing room where manuscript copy is set in type, proofed, and checked for errors. Machine and handset type and other materials such as photoengravings are assembled there and prepared for the pressroom.

In 1976, almost 40 percent of all printing craft workers—152,000—were employed in composing room occupations. This group includes *compositors* (D.O.T. 973.381) who set type by hand or machine; *typesetter perforator operators* (D.O.T. 208.588) who punch tapes used to operate some typesetting machines; *make-up arrangers* (D.O.T. 973.381) who assemble type in shallow trays called "galleys" and make trial copy of this type; and *proofreaders* (D.O.T.

209.688) who check the trial copy with the original copy for errors.

Electrotypers and stereotypers (D.O.T. 974.381 and 975.782) make duplicate pressplates of metal, rubber, and plastic for letterpress printing. These plates are made from the metal type forms prepared in the composing room. Electrotypes are used mainly in book and magazine work. Stereotypes, which are less durable, are used chiefly in newspaper work.

Photoengravers (D.O.T. 971.381) make metal printing plates of illustrations and other copy that cannot be set up in type. The printing surfaces on these plates stand out in relief above the nonprinting spaces, as do the letters and the accompanying type. Similarly, *gravure photoengravers* (D.O.T. 971.381), a specialized type of photoengravers, make gravure cylinders in which the image is etched below the surface for use in reproducing pictures and type.

The actual printing operation is performed in the pressroom. *Printing press operators* (D.O.T. 651.782, .885 and .886) prepare type forms and pressplates for final printing and tend the presses while they are in operation. Small commercial shops generally have small and relatively simple presses that often are fed paper by hand. At the other extreme are the enormous presses used by the larger newspaper, magazine, and book printing plants. They automatically print the paper and cut, assemble, and fold the pages. These machines are operated by crews of press operators assisted by less skilled workers.

Lithography (offset printing) has grown to be the most widely used method of printing. Practically all items printed by other processes also can be produced by lithography. It is a process of photographing the matter to be printed, making a printing plate from the photograph, and pressing the inked plate against a rubber blanket which in turn presses it onto the paper. Several operations are involved in lithography, and each is performed by a specialized group of workers. The main group of lithographic workers are *camera operators* (D.O.T. 972.382), *artists and letterers* (D.O.T. 971.281), *strippers* (D.O.T. 971.381), *platemakers* (D.O.T. 972.381), and *press operators* (D.O.T. 651.885).

Because of the increasingly complex and highly mechanized printing equipment in use today, technically trained people are needed in all areas of printing management and production. For example, an increasing number of *production technicians* (D.O.T. 019.281) are employed to see that the standards for each printing job are met.

Many printed items, such as books, magazines, pamphlets, and calendars, must be folded, sewed, stapled, or bound after they leave the printing shops. Much of this work is done by skilled bookbinders. In many binderies, however, a large portion of the work is done by less skilled bindery workers.

Besides printing craft workers, the industry employs people in a variety of other occupations. Many mailroom workers are employed in newspapers and magazine plants to address, bundle, and tie the printed matter for distribution. Modern mailroom processes are mechanized to a considerable extent. Mailers operate addressing, stamping, stacking, bundling, and tying machines. Many large printing firms employ mechanics and machinists to repair and adjust typesetting machines, printing presses, and other equipment.

Printing firms employ a great many people as executives, sales representatives, accountants, engineers, computer programers, stenographers, clerks, and laborers. Newspapers and other publishers employ a considerable number of reporters, editors, and photographers. These occupations are discussed elsewhere in the *Handbook*.

Training and Other Qualifications

Most printing craft workers (union or nonunion) learn their trades through established apprenticeship programs. A substantial number of people, however, learn these trades by working as helpers or through a combination of work experience and schooling.

Most printing unions, in conjunction with management, have established guidelines for apprenticeship programs for the various printing crafts. Many nonunion printing firms have established apprenticeship programs with the help of local printing associations and the employer organization Printing Industries of America. Apprentices often are chosen from among people already employed in various unskilled jobs in printing plants.

Printing apprenticeships usually last from 4 to 6 years, depending on the occupation and shop or area practices. The apprenticeship programs cover all phases of a particular trade and generally include classroom or correspondence study in related technical subjects, as well as on-the-job training. Apprenticeship applicants generally must be at least 18 years of age and pass an aptitude test and a physical examination. Applicants who qualify may be put on a waiting list if there are no immediate apprenticeship job openings.

Most employers prefer applicants to have a high school education or its equivalent. A thorough knowledge of spelling, punctuation, the fundamentals of grammar, and basic mathematics is essential in many of the printing trades. A knowledge of the basic principles of chemistry, electronics, and physics is becoming increasingly important because of the growing use of photomechanical and electronic processes in printing.

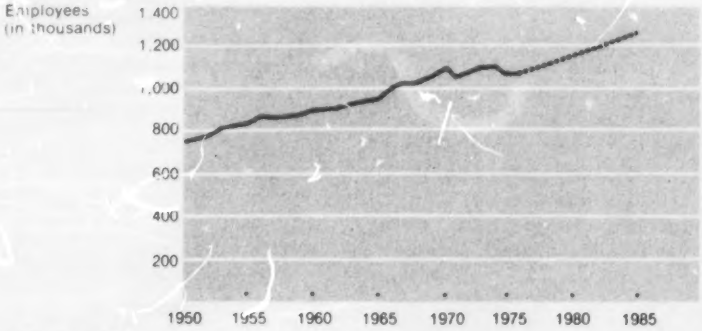
Most printing crafts require people with good eyesight, about average physical strength, and a high degree of manual dexterity. Alertness, patience, and the ability to work with others also are necessary. The ability to distinguish colors is important in areas of printing where color is used. An artistic sense also is an asset since the finished product should be pleasing in balance and design.

About 4,000 schools—high schools, vocational schools, technical institutes, and colleges—offer courses in printing technology. These courses may help a person to be selected for apprenticeships or other job openings in the printing and publishing industry.

Administrative jobs usually are filled by upgrading experienced people. Many owners and production managers of printing firms have

Employment in the printing and publishing industry has grown steadily, responding only slightly to economic downturns

Wage and salary workers in printing and publishing, 1950-76 and projected 1985



Source: Bureau of Labor Statistics

come from the ranks of printing craft workers. In recent years, however, more firms are filling administrative positions with people who have college degrees in business administration, marketing, accounting, industrial relations, or other specialized business fields. Most firms hire clerks, bookkeepers, stenographers, and typists who have completed commercial courses in high school or business school

Some computer programmers in the printing industry have technical school training; others learn their skills on the job. Also, many compositors and typesetters are being taught computer programming skills, and the International Typographic Union has established a training center for this purpose.

Employment Outlook

Employment in the printing and publishing industry is expected to grow more slowly than the average for all industries through the mid-1980's. Most job openings will occur from the need to replace experienced workers who retire, die, or transfer to other industries.

The volume of printed materials is expected to increase rapidly because of population growth, the increasingly high literacy level of the population, and the trend to greater use of printed materials for information, packaging, and various industrial and commercial purposes. Employment will grow at a slower rate than the volume of printing, however, because of laborsaving technological changes in printing methods.

Occupational groups in the industry are expected to increase at different rates. Employment of technical, maintenance, and clerical workers will increase at a faster pace than total employment. Employment growth will vary among the printing crafts. The number of lithographic craft workers, for example, is expected to increase because of the growing use of lithography. On the other hand, since lithography does not require photoengraving, employment of photoengravers is expected to decline. The trend to computerization of typesetting operations will reduce the need for some machine operators in composing rooms while creating a demand for more computer typesetters. More mechanics will be hired to maintain the industry's increasingly complex machinery.

Earnings and Working Conditions

Earnings of production workers in the printing and publishing industry are among the highest in manufacturing. In 1976, they averaged $5.67 an hour, while those in manufacturing industries as a whole averaged $5.19.

The accompaying tabulation shows average estimated union minimum hourly rates for selected printing occupations in 1976 based on a survey of 69 large cities. These are the minimum basic rates for daywork, and do not include overtime, other special payments, or bonuses.

Most printing craft workers who are covered by union contracts work fewer than 40 hours a week. Some contracts specify a standard workweek of less than 35 hours, but most fall within a 35 to 37-1/2 hour range. Time and a half generally is paid for overtime. Work on Sundays and holidays is paid for at time and one-half or double-time rates in most commercial printing firms. In newspaper plants, however, the workweek often includes Sundays. Time and one-half or double time is paid for these days only when they are not part of the employee's regular shift. Night-shift workers generally receive pay differentials above the standard day rates.

The starting wage rates of apprentices generally are from 40 to 50 percent of the basic rate for skilled workers in the shop. Wages are increased periodically, usually every 6

	Estimated average minimum hourly rate, 1976	
	Newspapers	*Book and job shops*
Bookbinders	—	$7.47
Compositors:		
Hand	$7.91	8.38
Machine operators	8.18	8.20
Electrotypers	—	7.23
Photoengravers	8.47	8.90
Press operators	7.65	—
Press (cylinder) operators	—	7.72
Press (platen) operators	—	6.63
Stereotypers	7.49	7.88

months, until the apprentice reaches the skilled rate.

The frequency of injuries in the printing industry is somewhat lower than the average for all manufacturing industries.

About 35 percent of all printing trades workers are members of unions. Among these unions are the Graphic Arts International Union, the International Printing and Graphic Communications Union, the International Typographical Union, and the International Mailers Union.

Sources of Additional Information

Details about employment opportunities and apprenticeships may be obtained from local employers, such as newspapers and printing shops, local offices of the unions mentioned above, or the local office of State employment services. Some State employment service offices screen applicants and give aptitude tests.

For general information on the industry, write to:

American Newspaper Publishers Association, 11600 Sunrise Valley Dr., Reston, Va. 20041.

American Photoplatemakers Association, 105 West Adams St., Suite 950, Chicago, Ill. 606043.

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

Gravure Technical Institute, 60 E. 42 St., New York, N.Y. 10020.

National Association of Printers and Lithographers, 570 Seventh Ave., New York, N.Y. 10018.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22209.

(See the section on printing occupations elsewhere in the *Handbook* for names of labor organizations and trade associations that can provide more information on specific printing trades.)

COMPOSITORS

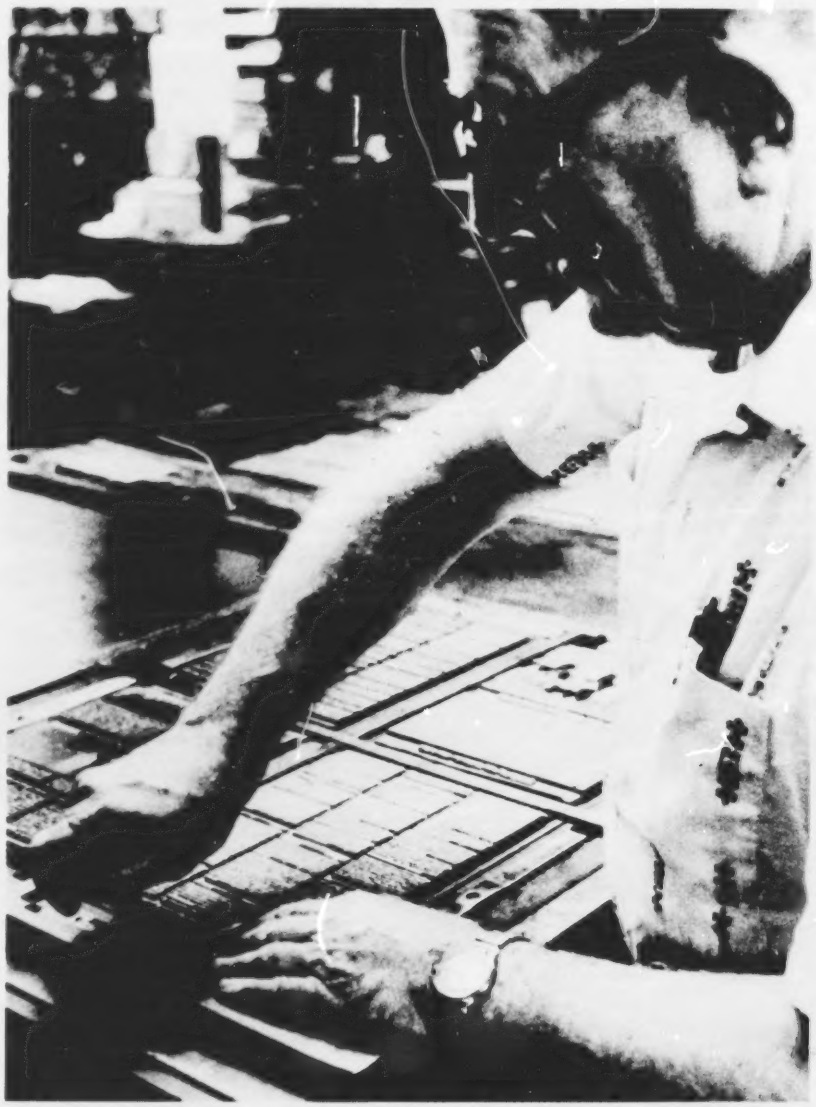
(D.O.T. 650.582, 654.782, and 973.381)

Nature of the Work

In a small shop, one person may do all the worked needed to complete a printing job. In large shops however, the work is divided among specialists. Editors select the material to be printed, while composing room workers prepare preliminary printing plates for press room workers who do the actual printing. Compositors, the most numerous of the composing room occupations, are vital to insuring that the job is completed accurately and on time.

After deciding what is to be printed and how it should look, editors send the material or "copy" along with a list of specifications to the composing room. There, a composing room supervisor reviews the editor's specifications and marks the manuscript with instructions about the style and size of type, column width, and size of pictures or illustrations. The copy—the term given to the material to be printed—then is given to a compositor who specializes in typesetting.

Hand compositors (D.O.T. 973.381) make up the oldest composing room occupation. Today, hand typesetting only is used for small jobs in which the setting of type by machine is impractical. Hand typesetters read from the copy and



A compositor apprenticeship generally covers a 6-year period.

set each line of type, letter by letter, on a "compositing stick," a device that holds type in place. They select the place where words will be divided and a hyphen placed if the word doesn't fit on a line (hyphenation), as well as adjust the spacing of the type with pieces of metal so that the line of type will be the width of the column. As each "stick" is filled, they slide the completed lines into a shallow metal tray called "galley."

Linotype and monotype machine operators are craft workers who operate semiautomatic machines that set type much more rapidly than hand methods.

Linotype machine operators (D.O.T. 650.582) read from copy clipped to the machine and operate a keyboard to select letters and other characters. As they press the keys, metal molds of the letters are assembled into lines of words. After completing a line, operators touch a lever and the machine automatically fills the molds with lead, forming a line of type into a solid metal strip called a "slug." The slugs are assembled into the type frames from which printing plates are made.

Monotype keyboard operators (D.O.T. 650.582) also operate a keyboard machine. However, instead of selecting metal molds, the monotype machine produces a perforated paper tape. *monotype keyboard operators* or *monotype caster operators* (D.O.T. 650.782) feed the tape into a machine that reads the tape and automatically select metal molds for each letter. The machine then forces molten metal into each mold to form the type.

While machines make their tasks easier, monotype and linotype machine operators must hyphenate and adjust type spacing to fit the width of columns. In small plants, operators also may maintain and repair typesetting machines.

Some typesetting will continue to be done by hand or with monotype and linotype machines. However, more and more firms are using phototypesetting machines, which can set type much more rapidly than linotype or monotype machines. With this equipment, a photographic process replaces the casting of type and the final product is a photographic film of the type rather than a metal slug.

In a common type of phototypesetting, a *phototypesetter* (D.O.T. 650.582) types in the text without regard to column width or hyphenation and produces a magnetic or perforated paper tape. The operator then feeds the tape containing the text into a computer that is programmed to do hyphenation and create columns of text. The computer creates a second tape—containing the text as it will appear when printed—that phototypesetters insert into a photocomposition machine. This machine displays the individual characters on the tape and photographs them. The phototypesetter then develops films of the material to be printed.

The most advanced method of typesetting uses electronic phototypesetting equipment. With this equipment, an operator uses a keyboard to select the size and style of type to select column width and provide spacing instructions, as well as to store each character in a computer. The computer then displays columns of type on a screen that is similar to a TV picture tube. Operators visually check the text and make any required corrections. They then photograph the screen to obtain a film of the material. These machines can prepare entire pages of type and any accompanying pictures instead of a single line of type.

After the copy is set, typesetters pass it to other compositors who arrange the columns of type, pictures, and illustrations according to the desired layout for each page. If letter press printing equipment are being used, they assemble the metal type and photoengravings in a large metal frame that clamps all the pieces together. If lithographic film equipment is being used, they cut the film of type and pictures and tape the pieces in place. Either method results in a preliminary printing plate.

After arranging all the pages of a particular job in proper sequence, compositors use a proof press to make a test of the entire job. Page proofs are checked with the original copy for errors and returned to the editor for final changes. After final changes have been put into the type, the plate is sent to the pressroom where production printing plates are made.

Places of Employment

About 152,000 workers were employed in composing room occupations in 1976. About one-third work for newspaper plants. Many others work for commercial printing plants, book and magazine printers, and Federal, State, and local governments. Some work for banks, insurance companies, advertising agencies, manufacturers, and other firms that do their own printing.

Composing room workers are located in almost every community throughout the country, but they are concentrated in large cities.

Training and Other Qualifications

Individuals who want to be all-round skilled compositors usually learn their skills through apprenticeship programs.

Generally, apprenticeship covers a 6-year period of progressively advanced training, supplemented by classroom instruction or correspondence courses. However, this period may be shortened by as much as 2 to 2-1/2 years for apprentices who have had previous experience or schooling or who show the ability to learn the trade more rapidly.

After basic training as a hand compositor, the apprentice receives intensive training in one specialized field or more, such as in the operation of typesetting machines, including phototypesetting machines, as well as in specialized work in hand composition and photocomposition.

Applicants for apprenticeship generally must be high school graduates and in good physical condition. They usually are given aptitude tests. Important qualifications include training in mathematics and English, especially spelling. Printing and typing courses in vocational or high schools are good preparation for apprenticeship applicants, and a general background in electronics and photography is becoming increasingly useful.

Artistic ability is an asset for a compositor in layout work. Many technical institutes, junior colleges, and colleges offer courses in printing technology, which provide a valuable background for people who are interested in becoming all-round compositors.

More and more compositors are bypassing the traditional apprentice approach and learning the work through on-the-job experience. Persons with good typing skills can learn to be phototypesetting machine operators in a relatively short period of time. These workers need not be trained as skilled compositors but they must be familiar with printing terms and measurements.

Employment Outlook

Employment in composing room occupations is expected to decline through the mid-1980's. Nevertheless, a few thousand job openings are expected each year as experienced workers retire, die, or change occupations.

In spite of the anticipated expansion in the volume of printing, employment in composing room occupations is expected to decline because of the trend to high-speed phototypesetting and typesetting computers. These high speed machines require fewer operators than the traditional hot metal method of typesetting.

For the jobs that do become available, opportunities should be best for persons who have completed post high school programs in printing technology, such as those offered by technical institutes and junior colleges. Many employers prefer to hire applicants who have completed these programs because the comprehensive training that they receive helps them learn composing room trades and adapt to new processes and techniques more rapidly.

Although most job opportunities will continue to be in the printing industry, a growing number will be found in other industries, such as paper and textile mills, which are doing their own typesetting instead of contracting it to printing firms.

Earnings and Working Conditions

Union compositors on the day shift in newspaper plants had an estimated average minimum rate of $7.91 an hour in 1976, according to a survey of 69 large cities. This rate was about one-half more than the average for nonsupervisory workers in all private industries, except farming.

Working conditions for compositors vary from plant to plant. Some heat and noise are made by typesetting machines. In general, the new plants are well-lighted and clean, and many are air-conditioned. Hand compositors have to stand for long periods and do some heavy lifting. People with some types of physical handicaps, such as deafness, have been able to work in the trade.

Sources of Additional Information

Details about apprenticeship and other training opportunities may be obtained from local employers, such as newspapers and printing shops, the local office of the International Typographical Union, or the local office of the State employment service.

For general information on composing room occupations, write to:

American Newspaper Publishers Association, 11600 Sunrise Valley Dr., Reston, Va. 20041.

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

International Typographic Composition Association, Inc., 2233 Wisconsin Ave. NW., Washington, D.C. 20007.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22209.

LITHOGRAPHERS

Nature of the Work

Lithography, also called offset printing, is one of the most rapidly growing methods of printing. It is a process of photographing the matter to be printed, making a printing plate from the photograph, and pressing the inked plate against a rubber plate which in turn presses it onto the paper.

Lithographers are responsible for a variety of printing activities ranging from photographing copy and pictures to making the final printing plates. Most lithographers are divided into specialized occupations such as camera operators, artists, strippers, and platemakers.

Camera operators (D.O.T. 972.382) start the process of making a lithographic plate by photographing and developing negatives of the material to be printed. They generally are classified as line camera operators, halftone operators, or color separation photographers. Negatives may need retouching to lighten or darken certain parts. *Lithographic artists* (D.O.T. 972.281) make these corrections by sharpening or reshaping images on the negatives. They do the work by hand, using chemicals, dyes, and special tools. Like camera operators, they are assigned to only one phase of the work, and may have job titles such as dot etchers, retouchers, or letterers.

Strippers (D.O.T. 971.281) arrange and paste the negatives onto layout sheets, which are used by platemakers to make press plates. Platemakers (D.O.T. 972.781) cover the surface of flat pieces of metal with a coating of photosensitive chemicals, or may use plates with the coating already applied. They then put the layout sheet on top of the

Many technical institutes, junior colleges, and colleges offer 2-year programs in printing technology.

plate and expose both to bright lights. As the final step, platemakers treat the plate with chemicals to bring out the images of the material to be printed. When a large number of plates or a multiple number of images are needed, operators use a photocomposition machine.

Places of Employment

About 29,000 skilled lithographers were employed in 1976. Many work for commercial printing plants, newspapers, and book and magazine printers. Some work for the U.S. Government Printing Office.

Although lithographic workers are located in all parts of the country, most are employed in large cities.

Training and Other Qualifications

A 4- or 5-year apprenticeship program usually is required in order to become a well-rounded lithographic craft worker. These programs may emphasize a specific craft, such as camera operator or lithographic artist, although an attempt is made to make the apprentice familiar with all lithographic operations.

Usually, apprenticeship applicants must be in good physical condition, high school graduates, and at least 18 years of age. Aptitude tests usually are given to prospective apprentices to determine if they are suited for the work.

Many technical institutes, junior colleges, and colleges offer 2-year programs in printing technology, which provide a valuable background for persons who are interested in learning lithographic crafts. High school and vocational school training in printing, photography, mathematics, chemistry, physics, and art also are helpful.

Employment Outlook

Employment of lithographers is expected to increase faster than the average for all occupations through the mid-1980's. In addition to the job openings resulting from employment growth, the need to replace workers who retire, die, or change occupations will provide some openings.

Employment of lithographic workers is expected to increase in response to the continued growth of offset printing. Commercial printing firms and newspaper publishers increasingly are using offset printing methods instead of letterpresses. Employment growth also will be stimulated by the greater use of photographs and drawings in printed matter, and by the more widespread use of color in many printed products.

Employment opportunities should be best for people who have completed post-high school programs in printing technology, such as those offered by technical institutes and junior colleges. Many employers prefer to hire applicants who have completed these programs because the comprehensive training they receive helps them learn lithography and adapt more rapidly to new processes and techniques.

Earnings and Working Conditions

Based on a survey of union wages in 69 large cities, it is estimated that in 1976, average minimum wages for lithographic artists were $8.98; for strippers $8.67; for camera operators $8.78; and platemakers $8.78. These rates were higher than the average for all nonsupervisory workers in private industry, except farming.

Lithographic workers are on their feet much of the time, but the work is not strenuous. They sometimes are under pressure to meet publication deadlines.

Many lithographic workers are members of the Graphic Arts International Union.

Sources of Additional Information

Details on apprenticeship and other training opportunities in lithographic occupations are available from local employers such as newspapers and printing shops, local offices of the Graphic Arts International Union, or the local office of the State employment service. For information on schools that offer courses in printing technology, write to:

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

For general information on lithographic occupations, write to:

American Newspaper Publishers Association, 11600 Sunrise Valley Dr., Reston, Va. 20041.

American Photoplatemakers Association, 105 West Adams St., Suite 905, Chicago Ill. 60603.

Graphic Arts International Union, 1900 L St. NW., Washington, D.C. 20036.

International Printing and Graphic Communications Union, 1730 Rhode Island Ave. NW., Washington, D.C. 20036.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22201.

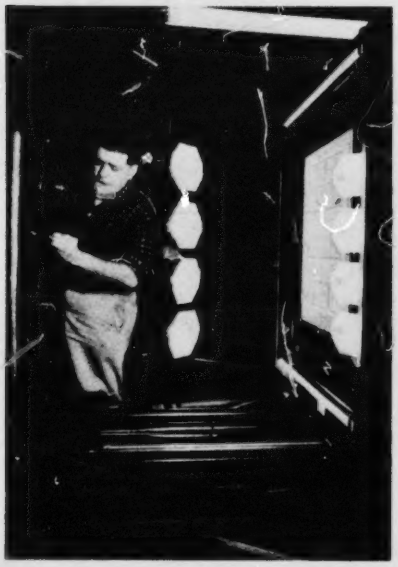
PHOTOENGRAVERS

(D.O.T. 971.281 and .382)

Nature of the Work

Photoengravers make metal printing plates of pictures and other copy that cannot be set up in type. In letterpress photoengraving, ink is rolled over a printed surface which stands higher than the rest of the plate. When paper is pressed against the raised surface, the print or image is picked up. Similarly, gravure photoengravers make gravure cylinders on which the image is etched below the surface of the cylinder. Ink is placed in the etched or sunken areas, and when paper is pressed against the surface the ink is lifted out and appears on the paper. In both methods, however, the work of photoengravers is the same.

For a typical job, photoengravers first mount the picture or copy to be reproduced on a board, adjust the position and focus of a camera, and take a picture. After developing the negative, they print its image on a flat, metal plate by coating the plate with a chemical solution sensitive to light, placing the negative on the plate, and exposing both to a bright light. As the final step in making the printing plate, photoengravers put the plate in an acid bath which eats the metal away from areas which will not be covered with ink. The areas to receive ink—those that were shielded from the light by the nega-



Most photoengravers learn their trade through a 5-year apprenticeship program.

tive—stand out to make contact with the paper.

The number of photoengraving operations performed depends on the quality of the printing required. Photoengravings for very high quality books or periodicals, for example, require more careful finishing than those for newspapers. Photoengravers use handtools to inspect and touch up the plates. They cut away metal from the nonprinting part of the plate to prevent it from touching the inking rollers during printing.

In a small shop, the entire photoengraving operation usually is done by one person. In large shops, however, the work is divided among specialists who perform a particular operation such as camera work, printing, or etching.

Places of Employment

An estimated 10,000 skilled photoengravers were employed in 1976. More than half work in commercial shops that make photoengravings for other printing firms. Newspapers and photogravure shops employ several thousand photoengravers. Book and magazine printers and the Federal Government also employ these workers. Many photoengravers have their own shops.

Although photoengravers are located in all parts of the country, employment is concentrated in large printing centers, such as New York, Chicago, Philadelphia, and Los Angeles.

Training and Other Qualifications

Most photoengravers learn their trade through a 5-year apprenticeship program that includes at least 800 hours of classroom instruction. In addition to the care and use of tools, the apprentice is taught to cut and square negatives, inspect negatives for defects, mix chemicals, sensitize metals, and operate machines used in the photoengraving process.

Apprenticeship applicants must be at least 18 years of age and generally must have a high school or vocational school education or its equivalent, preferably with courses in printing, chemistry, and physics. Many employers require a physical examination for prospective photoengravers. Good eyesight is particularly important because of the close work and color discrimination involved.

Employment Outlook

Employment opportunities for photoengravers are expected to be scarce in the years ahead. Despite the growing use of photographs and other illustrations in publications, employment of photoengravers will decline as many firms switch from letterpress to offset printing, which requires no photoengraving. Also, new technological advances such as color scanners and color enlargers plus the trend toward automated platemaking should reduce the need for these workers. However, some job openings are expected each year as experienced photoengravers retire, die, or leave the occupation for other reasons.

Earnings and Working Conditions

It is estimated that photoengravers on the day shift in newspaper plants earned an average minimum rate of $8.47 an hour in 1976, based on a union survey of 69 large cities. This average was about two-thirds more than the average for all nonsupervisory workers in private industry, except farming.

Photoengravers stand up much of the time, but the work is not strenuous. Work areas usually are air-conditioned and well-lighted. Most photoengravers are members of the Graphic Arts International Union.

Sources of Additional Information

Details about apprenticeship and other training opportunities may be obtained from local employers such as newspapers and printing shops, the local office of the union mentioned above, or the local office of the State employment service.

For general information on photoengravers, write to:

American Newspaper Publishers Association, 11600 Sunrise Valley Dr., Reston, Va. 20041.

American Photoplatemakers Association, 105 West Adams St., Suite 950, Chicago, Ill. 60603.

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

Graphic Arts International Union, 1900 L St. NW., Washington, D.C. 20036.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22201.

ELECTROTYPERS AND STEREOTYPERS

Nature of the Work

Electrotypers (D.O.T. 974.381) and *stereotypers* (D.O.T. 975.782) make duplicate press plates of metal, rubber, and plastic for letterpress printing. These plates are made from the metal type forms prepared in the composing room. Electrotypes are used mainly in book and magazine work. Stereotypes, which are less durable, are used chiefly for newspapers. Electrotyping and stereotyping are necessary because most volume printing requires the use of duplicate plates. When a large edition of a magazine or newspaper is printed, several plates must be used to replace those that become too worn to

Stereotyper prepares mats for casting machines.

make clear impressions. Also, by having duplicate plates, printers can use several presses at the same time and finish a big run quickly. Furthermore, many big plants use rotary presses, which require curved plates made by either electrotyping or stereotyping from flat type forms.

Electrotypers make a wax or plastic mold of the metal type form. They then coat the mold with chemicals and place the mold into an electrolytic bath that puts a metallic shell on the coated mold. Electrotypers then strip the shell from the mold and fill the back of the shell with molten lead to form a plate. After removing excess metal from the edges and back of the plate, electrotypers inspect the plate for any defects.

The stereotyping process is simpler, quicker, and less expensive than electrotyping, but it does not yield as durable or as fine a plate. Stereotypers make molds or mats of papier-mache' instead of wax or plastic. The mat is placed on the type form and covered with a cork blanket and a sheet of fiberboard. The covered form is run under heavy steel rollers to impress the type and photoengravings on the mat. Then the mat is placed in a stereotype casting machine which casts a composition lead plate on the mold. In many of the larger plants, automatic machines cast stereotype plates.

Some electrotypers and stereotypers do only one phase of the work, such as casting, molding, or finishing. Others handle many tasks.

Places of Employment

About 4,000 electrotypers and stereotypers were employed in 1976. Many electrotypers work in large plants that print books and magazines. Most stereotypers work for newspaper plants, but some work in large commercial printing plants. Electrotypers and stereotypers also are employed in service shops that do this work for printing firms.

Jobs in these trades can be found throughout the country, but employment is concentrated in large cities.

Training and Other Qualifications

Nearly all electrotypers and stereotypers learn their trades through 5- to 6-year apprenticeships. Electrotyping and stereotyping are separate crafts and relatively few transfers take place between the two. The apprenticeship program of each trade covers all phases of the work and almost always includes classes in related technical subjects as well as training on the job.

Apprenticeship applicants must be at least 18 years of age and, in most instances be able to pass physical examinations that usually are given to prospective apprentices. Due to the decline in demand for electrotypers and stereotypers, however, very few apprenticeships have been offered in the last several years. Many experienced electroplaters and stereotypers are now being retrained as plate makers in offset and press operators.

Employment Outlook

Job opportunities for electrotypers and stereotypers are expected to be scarce through the mid-1980's. Despite the anticipated increase in the volume of printing, employment of electrotypers and stereotypers is expected to decline because of labor-saving developments. For example, automatic plate casting eliminates many steps in platemaking. The use of plastic printing plates also requires less labor because such plates are more durable and reduce the demand for duplicate plates. Furthermore, the greater use of offset printing reduces the need for electrotype and stereotype plates, which are not needed in offset printing.

Earnings and Working Conditions

Based on a union wage survey, it is estimated that in 1976, union minimum wage rates in 69 large cities averaged $7.23 an hour for electrotypers and $7.88 an hour for stereotypers in book and commercial printing shops. Both averages were considerably higher than the average for all nonsupervisory workers in private industry, except farming.

Much of the work in these trades requires little physical effort since the preparation of duplicate printing plates is highly mechanized. However, some lifting of relatively heavy press plates occasionally is required.

Nearly all electrotypers and stereotypers are members of the International Printing and Graphic Communications Union.

Sources of Additional Information

Details about apprenticeship and other training opportunities may be obtained from local employers, such as newspapers and printing shops, the local office of the International Printing and Graphic Communications Union, or the local office of the State employment service.

For general information on electrotypers and stereotypers, write to:

American Newspaper Publishers Association, 11600 Sunrise Valley Dr., Reston, Va. 20041.

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

International Printing and Graphic Communications Union, 1730 Rhode Island Ave. NW., Washington, D.C. 20036.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22209.

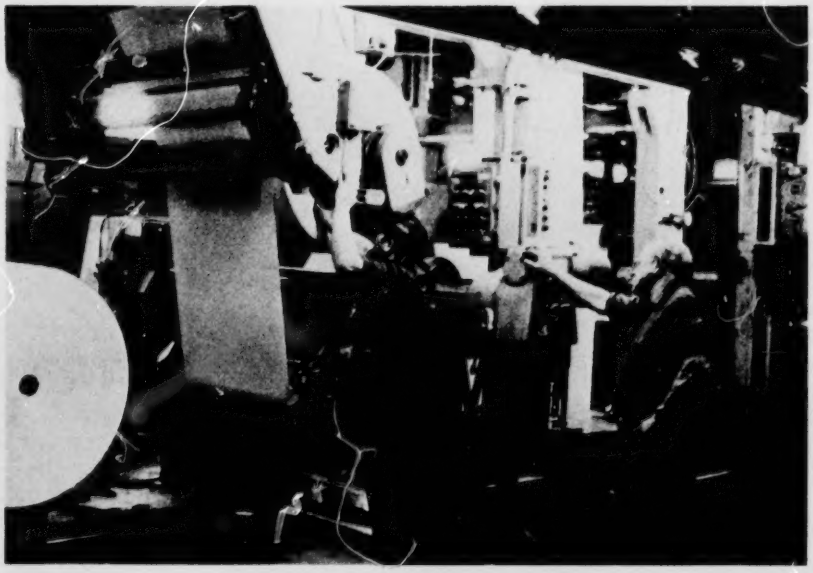
PRINTING PRESS OPERATORS AND ASSISTANTS

(D.O.T. 651.782, .885, and .886)

Nature of the Work

Printing operations are performed in a pressroom. Printing press operators prepare and operate the printing presses.

Before actually starting the press, press operators set up and adjust the press to insure that the printing impressions are distinct and uniform. Press operators first insert and lock type setups or plates into the press bed and then tighten the locking attachment with a wrench. The press operator then levels the press plates by placing pieces of paper that are exactly the right thickness underneath low areas of the plates.



Press operator adjusts controls.

Press operators also adjust control margins and the flow of ink to the inking roller. In some shops, they oil and clean the presses and make minor repairs. Press operators who work with large presses have assistants and helpers.

Press operators' jobs may differ from one shop to another, mainly because of differences in the kinds and sizes of presses. Press operators in small commercial shops generally operate relatively simple manual presses. On the other hand, a crew of several press operators and press assistants runs giant presses used by the large newspaper, magazine, and book printers. These presses are fed paper in big rolls called "webs" up to 50 inches or more in width. They print the paper on both sides; cut, assemble, and fold the pages; and count the finished newspaper sections as they come off the press.

Most press operators are generally designated according to the type of press they operate: letterpress, gravure, or offset.

Places of Employment

About 145,000 press operators and assistants were employed in 1976. More than half work for commercial printing shops and book and magazine publishers. Many others have jobs in newspaper plants. Some press operators and assistants work for banks, insurance companies, manufacturers, and other organizations that do their own printing, such as Federal, State, and local governments.

Press operators and assistants can find jobs throughout the country, but employment is concentrated in large cities.

Training and Other Qualifications

Most press operators learn their trade through apprenticeship, but some workers learn as helpers or press assistants. Others obtain their skills through a combination of work experience and vocational or technical school training.

The length of apprenticeship and the content of training depend largely on the kind of press used in the plant. The apprenticeship period in commercial shops is 2 years for press assistants, and 4 to 5 years for press operators. In addition to on-the-job instruction, the apprenticeship includes related classroom or correspondence school courses.

Courses in printing provide a good background. Because of technical developments in the printing industry, courses in chemistry and physics also are helpful. Mechanical aptitude is important in making press adjustments and repairs. An ability to visualize color is essential for work on color presses. Physical strength and endurance are needed for work on some kinds of presses, where operators lift heavy plates and stand for long periods.

Technological changes have had a tremendous effect on the skill requirements of press operators. For example, printing companies which change from sheet-fed offset presses to web-offset presses have to retrain their entire press crew because the skill requirements for the two types of press are very different. Web-offset presses, with their faster operating speeds, require faster decisions monitoring of more variables, and greater physical effort.

Advancement opportunities generally are limited. Press operators may advance in pay and responsibility by taking a job working on a more complex printing press or by becoming a supervisor.

Employment Outlook

Employment of press operators is expected to increase more slowly than the average for all occupations through the mid-1980's. Despite the increased use of faster and more efficient presses, more press operators will be needed because of the growth in the amount of printed materials.

In addition to the jobs from employment growth, a few thousand openings will arise each year as experienced workers retire, die, or leave their job for other reasons. However, printing press operators are expected to face competition for jobs. Since there are generally long waiting lists for apprenticeship programs, most people will have to take jobs as press assistants or unskilled laborers before being selected for an apprenticeship. It is not uncommon for a person to work 2 or 3 years or more before beginning apprenticeship training.

Since many firms are switching to web offset presses from letterpresses or sheet-fed presses, opportunities are expected to be more favorable for web-press operators.

Although most job opportunities will continue to be in the printing industry, a growing number of openings will be found in other industries, such as papermills, which are doing more of their own presswork instead of contracting it out to printing firms.

Earnings and Working Conditions

Based on a survey of union wages in 69 large cities, it is estimated that in 1976 the average minimum hourly rate for newspaper press operators-in-charge was $8.18; for newspaper press operators, $7.65; for book and job cylinder press operators, $7.72; and for book and job press assistants and feeders, $6.84. These rates were higher than the average for all nonsupervisory workers in private industy, except farming. Many press operators work night shifts and receive extra pay.

Pressrooms are noisy, and workers in certain areas frequently wear ear protectors. Press operators are subject to hazards when working near machinery. At times, they work under pressure to meet deadlines.

Many pressroom workers are covered by union agreements. The principal union in this field is the International Printing and Graphic Communications Union.

Sources of Additional Information

Details about apprenticeship and other training opportunities may be obtained from local employers such as newspapers and printing shops, the local office of the union mentioned above, or the local office of the State employment service.

For general information about press operators and assistants, write to:

American Newspaper Publishers Association, 11600 Sunrise Valley Dr., Reston, Va. 20041.

Graphic Arts International Union, 1900 L St. NW., Washington, D.C. 20036.

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

International Printing and Graphic Communications Union, 1730 Rhode Island Ave. NW., Washington, D.C. 20036.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22209.

BOOKBINDERS AND BINDERY WORKERS

Nature of the Work

Many printed items, such as books and magazines, must be folded, sewed, stapled, or bound after they leave the printing shops. Much of this work is done by skilled *bookbinders* (D.O.T. 977.781).

Edition-binding—making books in quantity from big, flat printed sheets of paper—is the most complicated kind of binding. Bookbinders first fold the printed sheets into units, known as "signatures," so that the pages will be in the right order. They then insert any illustrations that have been printed separately, gather and assemble signatures in proper order, and sew them together. They shape the book bodies with presses and trimming machines and reinforce them with glued fabric strips. Covers are glued or pasted onto the book bodies, and then the books undergo a variety of finishing operations and frequently are wrapped in paper jackets. Machines are used extensively throughout the process.

Bookbinders seldom perform all the different binding tasks, but many have had training in all of them. In large shops, bookbinders may be assigned to one or a few operations, most often to the operation of complicated machines, such as a large paper cutter or a folding machine.

In many binding shops much of the work is done by bindery workers who are trained in only one operation or in a small number of relatively simple tasks. For example, bindery workers perform such tasks as fastening sheets or signatures together using a machine stapler and feeding signatures into various machines for stitching, folding, or gluing operations.

Many bindery workers are trained in only one operation.

Some bookbinders work in hand binderies designing original bindings and special bindings for a small number of copies of a large edition or restoring and rebinding rare books. This skilled work requires creative ability, knowledge of materials, and a thorough background in the history of binding. Hand bookbinding is perhaps the only kind of binding that gives the individual an opportunity to work at a variety of jobs.

Places of Employment

About 80,000 bookbinders and bindery workers were employed in 1976. Many work in shops that specialize in bookbinding; others work in the bindery departments of book publishing firms, commercial printing plants, and large libraries. Some bookbinders work for the Federal Government.

Although bookbinders work in all parts of the country, employment is concentrated in large printing centers such as New York, Chicago, Washington, D.C., and Los Angeles.

Training, Other Qualifications, and Advancement

A 4- or 5-year apprenticeship, which includes on-the-job training as well as related classroom instruction, generally is required to qualify as a skilled bookbinder. Apprenticeship applicants usually must have a high school education, mechanical aptitude, and be at least 18 years of age. During the apprenticeship, trainees learn to assemble signatures; to renovate old, worn bindings; and to use various binding machines, such as punchers and folders.

Most bindery workers learn their tasks through informal on-the-job training that may last from several months to 2 years. A large number, however, learn through formal apprenticeship programs that include classroom instruction as well as on-the-job training.

High school students interested in bookbinding careers should take shop courses to develop their mechanical skills.

Advancement opportunities generally are limited. In large binderies skilled bookbinders with considerable experience may advance to supervisors.

Employment Outlook

Employment of bookbinders and bindery workers is expected to increase more slowly than the average for all occupations through the mid-1980's. Most job openings will arise as experienced workers retire, die, or change occupations.

Despite the anticipated growth in the amount of bound printed materials, employment growth will be limited by the increasing mechanization of bindery operations. For example, the use of integral folders that automatically fold pages as they come off the press eliminates the need for bindery workers to do the folding by hand.

Earnings and Working Conditions

Wage rates for skilled bookbinders tend to be below the average for other printing crafts. Based on a survey of union wage rates in 69 large cities, it is estimated that mininimum wage rates for bookbinders in publishing firms and bookbinding shops averaged about $7.47 an hour in 1976. This rate was about one and one-half times the average for all nonsupervisory workers in private industry, except farming.

Wage rates for bindery workers are considerably lower than the rates for bookbinders, and are among the lowest for printing industry workers. A survey of union wages in 69 large cities shows that in 1976 the average minimum hourly rate for bindery workers was $4.77.

Accuracy, patience, neatness, and good eyesight are among qualities needed by bookbinders. Good finger dexterity is essential for those who count, insert, paste, and fold.

Bookbinding shops tend to be noisy when machinery is operating. Bookbinders have some variety in their jobs, but the jobs of bindery workers tend to be monotonous. Long periods of standing and constant use of the arms can be tiring.

Many bindery workers are members of The Graphic Arts International Union.

Sources of Additional Information

Details about apprenticeship and other training opportunities may be obtained from local bookbinding shops, local offices of the Graphic Arts Union, or the local office of the State employment service.

For general information on bookbinding occupations, write to:

American Newspaper Association, 11600 Sunrise Valley Dr., Reston, Va. 20041.

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

Graphic Arts International Union, 1900 L St. NW., Washington, D.C. 20036.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22201.

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What to Look For in this Reprint

To make the *Occupational Outlook Handbook* easier to use, each occupation or industry follows the same outline. Separate sections describe basic elements, such as work on the job, education and training needed, and salaries or wages. Some sections will be more useful if you know how to interpret the information as explained below.

The TRAINING, OTHER QUALIFICATIONS, AND ADVANCEMENT section indicates the preferred way to enter each occupation and alternative ways to obtain training. Read this section carefully because early planning makes many fields easier to enter. Also, the level at which you enter and the speed with which you advance often depend on your training. If you are a student, you may want to consider taking those courses thought useful for the occupations which interest you.

Besides training, you may need a State license or certificate. The training section indicates which occupations generally require these. Check requirements in the State where you plan to work because State regulations vary.

Whether an occupation suits your personality is another important area to explore. For some, you may have to make responsible decisions in a highly competitive atmosphere. For others, you may do only routine tasks under close supervision. To work successfully in a particular job, you may have to do one or more of the following:

- motivate others
- direct and supervise others
- work with all types of people
- work with things—you need good coordination and manual dexterity
- work independently—you need initiative and self-discipline
- work as part of a team
- work with details, perhaps numbers or laboratory reports
- help people
- use creative talents and ideas
- work in a confined area
- do physically hard or dangerous work
- work outside in all types of weather

A counselor can help you find out more about your interests and abilities so you can judge whether a job's characteristics suit you.

The EMPLOYMENT OUTLOOK section tells whether or not the job market is likely to be favorable. Usually an occupation's expected growth is compared to the average projected growth rate for all occupations (20.1 percent between 1976 and 1985). The following phrases are used:

Much faster	50% or more
Faster	25.0 to 49.9%
About as fast	15.0 to 24.9%
Slower	4.0 to 14.9%
Little change	3.9 to -3.9%
Decline	-4.0% or more

Generally, job opportunities are favorable if employment is growing at least as fast as for the economy as a whole.

But, you would have to know the number of people competing with you to be sure of your prospects. Unfortunately, this supply information is lacking for most occupations.

There are exceptions, however, especially among professional occupations. Nearly everyone who earns a medical degree, for example, becomes a practicing physician. When the number of people pursuing relevant types of education and training and then entering the field can be compared with the demand, the outlook section indicates the supply/demand relationship as follows:

Excellent	Demand much greater than supply
Very good	Demand greater than supply
Good or favorable	Rough balance between demand and supply
May face competition	Likelihood of more supply than demand
Keen competition	Supply greater than demand

Competition or few job openings should not stop your pursuing a career that matches your aptitudes and interests. Even small or overcrowded occupations provide some jobs. So do those in which employment is growing very slowly or declining.

Growth in an occupation is not the only source of job openings because the number of openings from turnover can be substantial in large occupations. In fact, replacement needs are expected to create 70 percent of all openings between 1976 and 1985.

Finally, job prospects in your area may differ from those in the Nation as a whole. Your State employment service can furnish local information.

The EARNINGS section tells what workers were earning in 1976.

Which jobs pay the most is a hard question to answer because good information is available for only one type of earnings—wages and salaries—and not even this for all occupations. Although 9 out of 10 workers receive this form of income, many earn extra money by working overtime, night shifts, or irregular schedules. In some occupations, workers also receive tips or commissions based on sales or service. Some factory workers are paid a piece rate—an extra payment for each item they make.

The remaining 10 percent of all workers—the self-employed—includes people in many occupations—physicians, barbers, writers, and farmers, for example. Earnings for self-employed workers even in the same occupation differ widely because much depends on whether one is just starting out or has an established business.

Most wage and salary workers receive fringe benefits, such as paid vacations, holidays, and sick leave.

Workers also receive income in goods and services (payment in kind). Sales workers in department stores, for example, often receive discounts on merchandise.

Despite difficulties in determining exactly what people earn on the job, the Earnings section does compare occupational earnings by indicating whether a certain job pays more or less than the average for all nonsupervisors in private industry, excluding farming.

Each occupation has many pay levels. Beginners almost always earn less than workers who have been on the job for some time. Earnings also vary by geographic location but cities that offer the highest earnings often are those where living costs are most expensive.